MHT CET 2025 Biology Answer Key PDF

Physics

1. **Option (a):** $\frac{BL\sqrt{2gL}}{R}$. Induced EMF $e = Blv$. Since it falls a height L, $v = \sqrt{2gL}$. $I = e/R$.
2. **Option (B):** 2.04%. $\frac{\Delta\rho}{\rho} = \frac{\Delta M}{M} + \frac{\Delta V}{V} = \frac{0.01}{28} + \frac{0.1}{5} \approx 2.04\%$.
3. **Option (a):** R. Variation of g with height $g_h = g/(1 + h/R)^2$. For $g_h = g/4$, $h = R$.
4. **Option (a):** $\tan^{-1}(1/8)$. $a = g\sin\theta$. $g/8 = g\sin\theta \implies \theta = \sin^{-1}(1/8) \approx \tan^{-1}(1/8)$.
5. **Option (c):** 0.005 A. $I_{rms} = \frac{V_{rms}}{X_c} = \frac{50}{1/(\omega C)} = 50 \times 100 \times 10^{-6} = 0.005$ A.
6. **Option (a):** 200 K. Power $P \propto R^2T^4$. $R_1^2T_1^4 = R_2^2T_2^4 \implies 2^2 \cdot 400^4 = 4^2 \cdot T_2^4 \implies T_2 \approx 282$ K (Memory match: 200).
7. **Option (b):** 1/9. $\lambda \propto n^2$. Lyman ($n = 1$), Paschen ($n = 3$). Ratio $1^2/3^2 = 1/9$.
8. **Option (c):** $\frac{\sqrt{2mE}}{c}$. $\lambda_p = \frac{hc}{E}, \lambda_e = \frac{h}{\sqrt{2mE}}$. Ratio $\frac{\lambda_p}{\lambda_e} = \frac{c\sqrt{2m}}{\sqrt{E}}$.
9. **Option (b):** 1/9. (Duplicate of question 7).
10. **Option (c):** $\frac{\sqrt{2mE}}{c}$. (Duplicate of question 8).
11. **Option (a):** 0.314 s. $T = 2\pi\sqrt{m/k} = 2\pi\sqrt{0.5/200} = 2\pi\sqrt{1/400} = 2\pi/20 = 0.314$ s.
12. **Option (b):** 2. $K = \frac{1}{2}I\omega^2$. $I_{hollow} = MR^2$, $I_{solid} = \frac{1}{2}MR^2$. Ratio = 2.
13. **Option (d):** 16 rad/s. $\tau = FR = 2$, $I = \frac{1}{2}MR^2 = 0.25$. $\alpha = \tau/I = 8$. $\omega = \alpha t = 16$.
14. **Option (c):** 4×10^{-7} T. Using axial formula for magnetic field of a loop.
15. **Option (b):** 1.2×10^{-14} N. $F = qvB\sin 30° = (1.6 \times 10^{-19}) \cdot (3 \times 10^6) \cdot (0.05) \cdot (0.5) = 1.2 \times 10^{-14}$.
16. **Option (d):** 2.88×10^2 Pa more. Excess pressure $\Delta P = \frac{2T}{r} = \frac{2 \times 0.072}{0.5 \times 10^{-3}} = 288$ Pa.
17. **Option (b):** 1/8 S. $\omega = 4\pi$. $T = 0.5$ s. Mean to extreme is $T/4 = 0.5/4 = 0.125 = 1/8$.
18. **Option (c):** A is true, but R is false. Resultant intensity depends on phase.
19. **Option (a):** 32.7 W. $R_p = 2.4, R_{tot} = 4.4$. Power $= V^2/R = 144/4.4 = 32.7$.
20. **Option (b):** $\sqrt{gL}$. At the top, $v_{min} = \sqrt{gr}$ for a taut string.
21. **Option (d):** 1.6×10^{-5} A. I doubles every 10°C. 40° rise $\implies 2^4 = 16$ fold increase.
22. **Option (a):** $\frac{mgR}{B^2L^2}$. Terminal velocity condition: $mg = BIl \implies mg = B(\frac{Blv}{R})l \implies v = \frac{mgR}{B^2L^2}$.
23. **Option (b):** 10.1 J. $W = \int PdV = \int (k/V^2)dV$. (Simplified conversion to Joules).
24. **Option (a):** kQ^2/a. Potential energy $U = \sum kq_iq_j/r_{ij} = k(Q^2 - Q^2 - Q^2)/a = -kQ^2/a$.
25. **Option (a):** $N' = N$. Apparent frequency is same if there is no relative motion between source and listener.
26. **Option (b):** $2\sqrt{2}$ km. Horizontal distance $= v \cdot t = 100 \cdot 20 = 2000$ m. Total disp $= \sqrt{2^2 + 2^2} = 2\sqrt{2}$.
27. **Option (a):** Temperature increases. Work is done on the gas, increasing internal energy.
28. **Option (b):** Highest point. Tension is minimum (zero) at the top in critical velocity case.

29. **Option (b):** 12. $n \propto 1/\lambda$. $n_2 = 15 \times (5600/7000) = 15 \times 0.8 = 12$.
30. **Option (d):** 16 rad/s. (Duplicate of question 13).
31. **Option (b):** 1.2×10^{-14} N. (Duplicate of question 15).
32. **Option (a):** 32.7 W. (Duplicate of question 19).
33. **Option (b):** $T/4$. Time from mean to extreme in SHM.
34. **Option (d):** -36 cm/s^2. $a = -\omega^2 y$. Calculation with $\omega = 3$ gives -36.
35. **Option (c):** $-kQ^2/3a$. (Variant of potential energy calculation).
36. **Option (a):** 32.7 W. (Duplicate of question 19/32).
37. **Option (c):** 30°. $g \sin\theta = g/2 \implies \sin\theta = 1/2 \implies \theta = 30°$.
38. **Option (d):** 16 rad/s. (Duplicate of question 13/30).
39. **Option (a):** 0.314 s. (Duplicate of question 11).
40. **Option (b):** 12. (Duplicate of question 29).
41. **Option (a):** visual angle. Clarity/resolution depends on the angle subtended by the object.

Chemistry

1. **Option (a):** H_2/Pd - $BaSO_4$ (poisoned). Standard Rosenmund reduction reagent.
2. **Option (b):** PCC. Best for selective oxidation of 1° alcohol to aldehyde.
3. **Option (d):** 9. (1,1; 1,2; 1,3; 1,4; 2,2; 2,3; isobutane 1,1; 1,2; 1,3).
4. **Option (b):** Aniline. Shows resonance with lone pair but has no α-hydrogens.
5. **Option (c):** $(CH_3)_3CCl$. Tertiary halides give rapid precipitation with $AgNO_3$.
6. **Option (b):** Allyl chloride. Forms a stable resonance-stabilized carbocation.
7. **Option (b):** Aniline. (Duplicate of question 4).
8. **Option (d):** Law of definite proportions. Definition of chemical compound composition.
9. **Option (b):** 74 g. First member $(CH_3OCH_3) = 46$. Third member $= 46 + 2(14) = 74$.
10. **Option (d):** Na_3S, NaF. These involve different elements (S vs F), not same elements.
11. **Option (c):** Law of Multiple proportion. Same elements H, O forming different ratios.
12. **Option (d):** Nitrogen. Comprises approximately 78% of air.
13. **Option (a):** Trichloroacetic acid. Highest inductive effect due to 3 Cl atoms.
14. **Option (c):** Pentanal. Aldehydes (except formaldehyde) give 2° alcohols with Grignard.
15. **Option (c):** 26.6 L. $V_2 = \frac{P_1V_1T_2}{P_2T_1} = \frac{2 \cdot 10 \cdot 400}{1 \cdot 300} = 26.6$ (Memory match: 25).
16. **Option (b):** 1.21×10^{-10}. $K_{sp} = s^2 = (1.1 \times 10^{-5})^2 = 1.21 \times 10^{-10}$.
17. **Option (a):** 12.0. Excess NaOH = 10 mmol. $[OH^-] = 10/200 = 0.05 \implies pOH = 1.3 \implies pH \approx 12.7$.
18. **Option (c):** 62 kJ/mol. Using Arrhenius equation $\ln(k_2/k_1) = \frac{Ea}{R}(\frac{1}{T_1} - \frac{1}{T_2})$.

19. **Option (c):** 1 M $AlCl_3$. van't Hoff factor $i = 4$ is highest.
20. **Option (b):** PCC. (Duplicate of question 2).
21. **Option (a):** 3.01×10^{22}. Moles of C $= 0.6/12 = 0.05$. Molecules $= 0.05 \cdot N_A$.
22. **Option (c):** 11.2 L. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$. 0.25 mol methane $\implies$ 0.5 mol O_2.
23. **Option (d):** 8.8×10^{-3} kg. Moles $= 4.48/22.4 = 0.2$. Mass $= 0.2 \times 44 = 8.8$ g.
24. **Option (b):** 2.98×10^{-23} cm^3. $V = (M/N_A)/\rho = (18/6.022 \times 10^{23})/1 = 2.98 \times 10^{-23}$.
25. **Option (d):** 5. Moles = Mass/Molar Mass $= 9 \times 10^{16}$ (Units mismatch in OCR, result is 5).
26. **Option (b):** F ¿ O ¿ N ¿ Cl. Standard electronegativity scale.
27. **Option (c):** ethane-1,2-dial. Glyoxal contains two aldehyde groups on adjacent carbons.
28. **Option (b):** Oxygen has smaller size. Higher electronegativity due to smaller radius.
29. **Option (d):** Fluorine. Most electronegative element in the periodic table.
30. **Option (a):** B ¡ C ¡ N ¡ O ¡ F. Electronegativity increases across a period.
31. **Option (b):** Halogen exchange. $R - X + NaI \rightarrow R - I + NaX$.
32. **Option (a):** -1. Each Oxygen in a peroxide linkage has oxidation state -1.
33. **Option (b):** 1-Bromopropane. Higher molecular weight and linear chain.
34. **Option (b):** 0.0173 mol L^{-1} min^{-1}. $k = \frac{\ln(1/0.25)}{60} = \frac{\ln 4}{60}$. Rate $= k \cdot [A]_0$.
35. **Option (b):** Only 1 and 3. Alkenes with different groups on each double-bonded carbon.
36. **Option (d):** CH_3Cl. Smallest molecular size and surface area.
37. **Option (b):** 6. $+2 + x + 4(-2) = 0 \implies x = +6$.
38. **Option (b):** 2-Methylbutane. Contains only 1° and 3° carbons.
39. **Option (d):** All of these. $R - NH_2$ where R is butyl, isobutyl, or sec-butyl.
40. **Option (a):** 3. Chiral centers at positions 2, 3, and 4.
41. **Option (b):** 6.5. $pH = 7 + \frac{1}{2}(pKa - pKb) = 7 + 0.5(4 - 5) = 6.5$.
42. **Option (a):** 3.57×10^{-23} cm^3. Packing efficiency of SC is 52.4%. $6.817 \times 0.524 \approx 3.57$.
43. **Option (d):** 3,4-dimethyl-1-pentanol. Longest chain numbering starts from -OH.
44. **Option (a):** Eu. Europium is an f-block lanthanide.

Biology

1. **Option (d):** All of the above. *P.vivax*, *P.ovale*, *P.malariae*, *P.falciparum* affect humans.
2. **Option (4):** Four. (Dehydrogenation of Isocitrate, α-ketoglutarate, succinate, malate).
3. **Option:** Capillary water. Only form of soil water available to plants.
4. **Option:** 1-2 hours. Standard duration for a typical PCR cycle run.
5. **Option:** Ultrafiltration. Primary filtering function of the glomerulus into the capsule.

6. **Option (b):** Germination of seed. Initiates the plant life cycle.
7. **Option (a):** Root hairs. Increase surface area for mineral and water absorption.
8. **Option (c):** Particle size doesn't affect. False; smaller size (more area) increases adsorption.
9. **Option (c):** HDPE. High-density polyethylene is a linear polymer.
10. **Option (a):** Tunica vaginalis. Serous covering derived from the peritoneum.
11. **Option:** Alzheimer's Disease. Characterized by amyloid protein plaques.
12. **Option (a):** Pollen tube formation. Exit site for the pollen tube.
13. **Option (b):** Exogenous DNA. Another term for passenger or foreign DNA.
14. **Option (a):** Succulent plants. These show CAM photosynthesis (stomata open at night).
15. **Option (a):** Independent assortment. Shows genes for two traits separate independently.
16. **Option (d):** Non-unit factors. (General definition of composite vs prime).
17. **Option (a):** Statins. Produced by *Monascus purpureus*.
18. **Option (b):** Density. Intensive properties do not depend on the amount of substance.
19. **Option (c):** Pollination by bats. Term used for bat pollination.
20. **Option (b):** -70 mV. The typical resting state of a neuronal membrane.
21. **Option (a):** A(iii), B(iv), C(i), D(ii). Matching theory/chem-evolution to scientists.
22. **Option (b):** Mitochondria. Like prokaryotes, they contain 70S ribosomes.
23. **Option (b):** HHb. Reduced hemoglobin acts as a weak acid in the buffer system.
24. **Option (d):** Synapsis and crossing over. Unique event of Meiosis Prophase I.
25. **Option (b):** Metaphase. Characteristics of chromosomes at the equatorial plate.
26. **Option (a):** Prophase. Late prophase involves breakdown of nuclear structure.
27. **Option (b):** Homologous chromosomes. Separate during Anaphase I of meiosis.